

**Statement of
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**Before the Committee on Science
U.S. House of Representatives**

March 2, 2006

Mr. Chairman and Members of the Committee:

I am grateful for the opportunity to testify before you today. I have appeared before this Committee many times in my former job as the NASA Associate Administrator for Space Science, and few times since. I now appear before you to address concerns about the future of America's earth and space science in NASA's proposed FY07 budget.

The top line for NASA

I am an advocate for the scientific exploration of space—using both robotic and human elements—with the emphasis on *scientific* exploration. I also believe in the President's new Space Policy and that the CEV is the right way to start. But this FY07 budget proposes to implement the 2-year old Vision for Space Exploration without sufficient funding, and as a consequence does considerable damage to NASA's robotic, scientific exploration program. NASA's plans have been called Apollo on steroids, but the budget provided is Apollo on food stamps.

Two years ago when the President released his Vision, he provided an FY05 budget proposal with new funds in the five-year run out that would support it. In the intervening years, the Administration has reduced this budget to the point where the plan is insupportable. Last year, the Administration cut that budget, forcing the agency to take the money from aeronautics and technology funding. This year, the Administration has reduced the budget yet again, forcing the agency to take an even larger chunk of money from the only enterprise left undamaged in the agency—science.

The White House wants U.S. obligations to the international space station partners to be honored, the space shuttle flown as many times as necessary to complete the station's construction, and a replacement for the Shuttle (the Crew Exploration Vehicle, or CEV) flying by 2014. The only problem is that these requirements were handed to NASA without the \$3 billion to \$5 billion necessary for flying the required number of Shuttle flights to complete space station construction. This forced the NASA administrator to cannibalize the agency's science program even though he promised last year not to transfer "one thin dime" from scientific exploration into human spaceflight.

The President's Space Policy is not just about human space flight. The very first goal stated in the vision is to "implement a sustained and affordable human and robotic program to explore the solar system and beyond." The vision further advocates that we "conduct robotic exploration across the solar system for scientific purposes and to support human exploration." This eye of the vision seems to have lost its sight.

The top line for NASA Science

The Administration's 2007 budget proposal removes \$3.07 billion from the previously planned 5-year run out of the Earth and space science budget. Of this, \$2.99 billion is to come from solar system exploration alone. Of the several disciplines in earth and space science, solar system exploration alone is to pay 97% of the bill for the Shuttle even though robotic exploration of the solar system is one of the most relevant of science enterprises to human exploration.

This simply cannot be done without serious damage to an enterprise and community that should, and needs to be, a partner with human exploration.

NASA officials attempt to put positive spin on this damage by citing the growth of space science in NASA from about 21 percent of the budget in 1992 to 32 percent today. But, during that same time period space science has been carrying the agency exploration flag, and the agency has been rightly proud of the productivity of the Earth and space sciences. Missions such as Hubble, Mars Exploration Rovers and Cassini/Huygens are, as Administrator Griffin himself said, the "crown jewels" of NASA. Yet he has set NASA science on a declining course, not even keeping up with the projected growth in the rest of the agency over the next five years.

Does it make good business sense to damage the most productive enterprise in your portfolio to promote a poorly performing one that you firmly expect to terminate in five years?

The President wants to grow Federal investment in science

And does it make sense to cut science in NASA when the President told the Nation in his State of the Union address that we must increase our investment in science to insure that America retains its competitive edge? The Senate has taken action on this issue with the "Preserving America's Competitive Edge" Acts (PACE Acts). But the NASA budget ignores both the President's directive and language in S.R. 2198 authorizing 10% increases in NASA basic research through 2013. Congress should correct this oversight as the House moves to bills similar to the Senate's PACE Acts.

The President's arguments on the need to increase Federal support of the physical sciences are particularly true of NASA science. Space exploration is an enormous draw to young people. This Nation never saw such an increase in new science graduates than after the start of the Space Age in 1957. Now, at the start of the President's new Vision

for Space Exploration, we are doing everything we can to turn off brilliant young earth and space scientists by pulling the rug out from their prospects for the future.

The FY07 budget proposal and the NRC's Solar System Decadal Report

The FY07 budget proposal does serious damage to the course set for the Nation's solar system exploration enterprise in the NRC's Solar System Decadal Report through its recommendations for research, technology and flight missions. This National Academy report establishes the scientific goals for robotic solar system exploration for the decade 2003-2012, the measurements at solar system destinations required to meet those science goals, and the flight missions necessary to travel to these destinations. The report also makes recommendations on the basic research and technology developments required to support those flight missions and to prepare for future missions beyond the next decade.

Depleting the Science Pool

NASA's earth and space science enterprise is not just about flight missions. It is foremost about science. Flight missions are the tools for conducting that science—for implementing scientific exploration of our solar system and beyond. Science flight missions are not furnished by the government to the science community, they are created by the science community. Scientists constantly generate new science questions from their research and from previous mission results. They then devise the measurements that need to be made in order to answer those questions. And finally they work with the engineers to create flight mission concepts to make those measurements at solar system destinations. These scientists are spread throughout the country, conducting their basic research in universities, research centers and NASA Centers. They are supported primarily by NASA research grants in what's known as Research and Analysis programs, or R&A, and by grants for mission data analysis also now covered in the R&A portion of the SMD budget.

While the 2003 Solar System Decadal Report recommends that R&A be increased over this decade at a rate above inflation, the FY07 budget would reduce funding for R&A by 15% across the board. For reasons hard to fathom, one particular program, Astrobiology, is targeted for a 50-percent reduction. Astrobiology was specifically named by the Decadal report as an important new component in the R&A program and is recognized even outside NASA as the agency's newest and most innovative research program bringing biologists, geologists and space scientists together to understand the earliest life on Earth and how we might search for life elsewhere beyond our own planet.

The consequences of these unprecedented reductions would be to cripple the ability of NASA's science enterprise to create the next generation flight missions and worse of all it will short-circuit the careers of many young scientists. Precisely the opposite of what this country needs to remain competitive.

And all these cuts are immediate – today, in the 2006 budget year. Grants are to be reduced immediately, dimming the prospects of many young, motivated students now.

What kind of message is that to the best and brightest of American's hopes for a rich technological future? And if there is to be any science at all in human space flight to the Moon and beyond, it needs to come from these young people.

Reducing Flight Missions

The Decadal Report also prioritizes the flight missions proposed for the next decade within separate cost categories—small, medium and large.

For small missions, the report assumes a Discovery program of low cost, competed missions at a rate of about one launch per 18 months or about 6 per decade, and for the Discovery-like Mars Scouts about 3 launches per decade. Both of these assumptions are based on their historical annual budget levels.

For medium class missions, the report assumes a New Frontiers program of competed missions at a rate of about 3 per decade. This is the rate established for the New Frontiers line when it was opened with the Pluto/Kuiper Belt mission.

For large, flagship missions, the report assumes 1 per decade based on historical data for new starts in this category (Viking in the 1970s, Galileo in the 1980s, and Cassini-Huygens in the 1990s).

For the Mars Exploration flight program, the Decadal report assumed approximately two launches every 26 months, either two medium class launches or one medium and one small Mars Scout mission depending on timing and cost for the specific missions. This was based on the annual funding level for Mars Exploration in 2003.

The major damage in the FY07 budget to solar system flight missions is to the Mars and the Outer Planets flight programs. Mars flight missions are reduced from a nominal 2 launches per opportunity to only 1, and the number of medium missions is reduced by alternating launch opportunities between medium and small. Two Mars Scouts are eliminated, technology developments for missions beyond 2009 are reduced, and developments for a potential Mars Sample Return mission in the next decade practically eliminated. All of this will hobble our search for signs of past water and perhaps early life on our next-door neighbor.

For the Outer Planets flight program, the Europa Orbiter mission, only flagship mission and the highest science priority, is deferred to the next decade. For the first time in 4 decades there will be no solar system flagship mission at all. For science, we will remain ignorant that much longer of Europa's deep ocean and the potential for life within it.

The Discovery program of small missions is already in prolonged delay and there will be no launch until the end of the decade, for a hiatus of more than four years since the last. And the third New Frontiers mission selection is delayed by about a year.

The inevitable result of these delays and deletions is the potential loss of technological expertise to conduct these missions. Young scientists and engineers will be forced to look elsewhere for a more reliable, sustainable career path. It is not possible to retain the best of people if there is a lack of stability and a no clear sense of a strong future. You can't have world-class flight missions without world-class people.

Tossing Technology

For this reason, more than the flight mission delays themselves, a failure to continue to develop the technologies required for accomplishing future missions short circuits the future. Sustaining funding for technology development is the key to surviving hard times in flight mission development and guaranteeing a future. This budget does just the opposite.

Concern for the future

The bottom line is that the future of our Nation's solar system exploration enterprise has been mortgaged. The momentum of current mission development will carry it for about two years, and then the bottom begins to fall. We must sustain the science and technology that will afford us a new future when we get there two years from now.

Consistent with the NRC Decadal study, the most important elements to sustain the enterprise are the fundamental research programs that form the basis for solar system exploration and the lowest cost, highest flight rate, widely competed flight programs in the small to medium flight mission lines. And if we are ever to recover, we must also invest in our technological readiness for flagship missions in the future.

Is this the best Vision?

The Vision is about robots and humans exploring to find our destiny in the solar system together. Instead of drawing on the strengths of both, this budget pits one vs. the other and undermines the Vision rather than promoting it. It pawns a planetary exploration program that is the envy of the world to pay for a program beset with problems and slated for termination.

The Administrator's budget message said about the Vision, "we will go as we can afford to pay." But the only way he can pay is by taking resources from the future of science and robotic exploration. If these annual reductions in NASA's budget continue, and if NASA continues to drain resources from science and technology, then America can retire as the leading nation in the scientific exploration of space, whether by robots or by humans.

Respectfully submitted,

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